**Before the**

**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, DC. 20554**

| | | |
|---|---|---|
| **In the Matter of** | **)** | |
| | **)** | |
| **Inquiry Regarding Carrier** | **)** | **ET Docket No. 03-104** |
| **Current Systems, including** | **)** | |
| **Power Line Broadband Systems** | **)** | |
| | **)** | |

**To: The Commission**

**ADDITIONAL COMMENTS of Nickolaus E. Leggett**
**N3NL Amateur Radio Operator**

The following is a set of comments from Nickolaus E. Leggett, an amateur radio operator (Extra Class licensee – call sign N3NL), inventor (U.S. Patents # 3,280,929 and 3,280,930 and one electronics invention patent application pending), and a certified electronics technician (ISCET and NARTE). I also have a Master of Arts degree in Political Science from the Johns Hopkins University (May 1970).

This is my second set of comments in this proceeding. My comments focus on the Commission's questions: Is there a need to define frequency bands that must be avoided in order to protect the licensed users on the same frequencies as those used by Access BPL systems? and Is there a need to define frequency bands that must be avoided in order to protect the licensed services that use the same frequencies as In-House BPL systems?

These comments focus on the details of Broadband over Power Line (BPL) impact on individual users of the short wave (high frequency) radio spectrum.

I submitted my first set of comments on May 2, 2003**.**

**Noise Generators on the Short-wave Radio Spectrum**

In the early part of the 20th Century, spark gap radio transmitters were used to transmit radio messages. Each spark gap transmitter sent out a broad band of radio frequencies. The transmitter was keyed to send radiotelegraph messages. Over time, a new type of transmitter using a narrow-band continuous wave (CW) signal was introduced. Eventually, the Federal authorities outlawed the spark gap transmitters because they were inefficient users of the spectrum compared to the new CW radiotelegraph stations.

This was the first Federal step to protect the purity and efficiency of the radio spectrum. Over time additional regulatory steps were taken to protect the spectrum. These steps included regulations that required that radio transmitters be designed and constructed so that spurious and harmonic emissions were suppressed.

This long history of establishing greater and greater spectral purity contrasts to the current situation with BPL where the purity of the high frequency (short wave) spectrum would be significantly degraded by Commission action. Many of us in the radio field are asking why we should pay this very high price in order to allow the operation of BPL. One method to mitigate this very high cost is to set aside designated frequency ranges that may not be used for BPL operation.

**Educational Radio Astronomy – Radio JOVE**

Educational organizations, with the assistance of the National Aeronautics and Space Administration (NASA), operate the Radio JOVE project. In this project, students operate simple radio telescopes in the frequencies near 20.1 MHz (+/- 150 kHz). The students build these radio telescopes from kits and they use them to observe radio emissions from Jupiter and the Sun. Each of these radio telescopes consists of an antenna, a receiver, and a recorder. The

receiver is a direct conversion receiver that converts the received radio frequency emissions to audio frequency. The recorder stores the data received for computer analysis. More details on the Radio JOVE system are presented in Appendix A of this document.

The received signals from Jupiter are very weak (less than 1 microvolt at the receiver antenna terminals). This means that the Radio JOVE radio telescopes are very vulnerable to the radio emissions from neighborhood BPL operations. In this regard, we must remember schools, colleges, and the residences of individual experimenters are very close to the power lines used by BPL.

The Radio JOVE efforts could be protected by prohibiting BPL operations in a narrow band of frequencies around 20.1 MHz. These Radio JOVE frequencies should be set aside with no BPL emissions allowed by Access or In-House BPL systems. However, this very useful step would not protect the other decameter radio astronomy operations that listen to Jupiter at frequencies ranging from approximately 15 MHz to 40 MHz. We need another mechanism to protect radio astronomy in general. The Commission should formally poll the radio astronomy community on this subject. Please remember that radio astronomers are stuck with the "frequency assignments" established by nature. You cannot change the radio frequency allocation for the Sun and for Jupiter. In addition, many radio astronomy sources are very broadband in nature covering a wide range of frequencies. It may be necessary to keep BPL operation off of the frequency range of 15 to 40 MHz in order to protect radio astronomy.

**Short-wave Listening**

Many people operate short wave receivers in their homes to listen to international short wave broadcasts. These broadcasts are transmitted on frequency bands established by international agreement. Many of the short wave broadcasts are fairly weak signals especially

since many listeners are limited to indoor antennas due to restrictive covenants and homeowner association regulations. All of these international short wave broadcasting bands should be set aside with no BPL emissions allowed by either Access or In-House BPL systems.

The prohibition on emissions by In-House systems would protect a short wave listener from In-House BPL emissions from a neighboring apartment. This would be very useful for people such as myself who live in an apartment or condominium building.

**Amateur Radio Operating**

Amateur radio is a similar situation as short wave listening in terms of reception of incoming radio signals. However, amateur radio transmitters use much less output power than international short-wave broadcasters do. This means that the received signals are much weaker than international broadcasts and thus are even more susceptible to interference from both Access and In-House BPL. In addition, many amateur radio operators are limited to indoor antennas by restrictive covenants and homeowner associations. This weakens both the received and transmitted amateur radio signals. Therefore, all of the allocated amateur radio frequency bands should be set aside with no BPL emissions allowed by either Access or In-House BPL systems.

There is an additional problem with amateur radio. The BPL system would probably be highly susceptible to interference from amateur radio transmitters operating in the high frequency bands. Many amateur radio transmitters operate at over 100 Watts output power and some operate at over 1000 Watts. Both Access and In-House BPL systems will have to be designed to be immune to such amateur radio interference (as well as lower-power Citizens Band interference). This is essential for neighborhood peace and tranquility. Also, if the Access BPL is used to control the power grid and meter reading, interference susceptibility standards become

vitally important for the electric utility reliability and safety. If the Commission does not require BPL resistance to amateur radio interference, then amateur radio will be effectively banned in any area having Access BPL. Indeed, this electric utility safety consideration recently blocked the proposed assignment of a small low-frequency (135.7 to 137.8 kHz) allocation to the amateur radio service. Refer to ET Docket 02-98.

This de facto shutdown of amateur radio could also occur with In-House BPL. If amateur radio transmissions cause interference with home computer networking or intelligent appliance operation, the amateur operator will soon be forced to stop operating even though his or her station is in full compliance with the Commission's rules.

**Citizens Band Operation**

The situation for Citizens Band operation is very similar to that encountered by amateur radio. For this reason Access BPL and In-House BPL should be blocked from the 27 MHz Citizens Band. Similarly, both BPL systems should be required to be immune to CB interference.

**Military Affiliate Radio System (MARS)**

Volunteer amateur radio operators relay morale messages for American servicemen and women through the Army, Navy-Marines, and Air Force MARS systems. The volunteer amateurs operate from their residential radio stations using military frequencies on the short wave spectrum. Many of these MARS stations operate on frequencies around 5 MHz and operate at power levels above 500 Watts output power.

All of the military MARS frequencies should be off limits for both Access BPL and In-House BPL. In addition, as in the case of amateur radio and CB radio, the BPL systems and equipment must be required to be immune to interference received from MARS station

operations. In this era of numerous overseas deployments of American forces, we must act to support our troops by supporting interference-free MARS operations on the short wave spectrum.

**Frequency Allocation Changes**

There is an additional problem with Access BPL and In-House BPL. How can new allocations for amateur radio or international short-wave broadcasting be accommodated? We could easily arrive at a situation where access to newly allocated frequency bands would be blocked by the roaring static of the BPL systems.

**Social Science Observations**

As a social scientist, I am very interested in the Commission's movement from being a fairly neutral "Supreme Court" of communications to being an open advocate of various technologies proposed by industry. While it is perfectly fine to be an advocate of new innovative technologies, this advocacy must not impose new prohibitions on the legitimate citizen users of the short-wave radio spectrum. If these users are in effect thrown away in an enthusiastic pursuit of new technology, then a lasting political and social problem will be created. These existing users' interest in the short wave spectrum will not go away. Many of these existing users view the issue of BPL interference as an environmental issue where an important natural resource (the short wave spectrum) will be polluted by radio smog.

**Recommended Actions**

Block Access BPL and In-House BPL from the frequency bands used by amateur radio, Citizens Band radio, international short-wave broadcasting, MARS systems, and decameter radio astronomy. Require that both Access BPL and In-House BPL systems and equipment be

immune to interference caused by amateur radio transmitters, and Citizens Band transmitters that comply with the Commission's rules. Include similar protections for MARS transmitters.

Consider that the cost of BPL may be too high in terms of radio smog in the short wave spectrum. The short wave spectrum belongs to all of mankind and should remain as a useful resource for mankind.

**Respectfully submitted,**

**Nickolaus E. Leggett, N3NL**
**1432 Northgate Square, Apt. 2A**
**Reston, VA 20190-3748**
**(703) 709-0752**
**nleggett@earthlink.net**

**May 29, 2003**

**Appendix A – Aspects of the Radio JOVE Radio Telescope**

Antenna – Two-element phased dipole array

Direct conversion receiver tuning around 20.1 MHz (plus or minus 150 kHz)

Receiver stages:

- RF Bandpass filter
- RF Preamplifier
- Local oscillator/mixer
- Low pass filer (up to 3.5 kHz)
- Audio preamplifier
- Audio amplifier

**Components**

***Integrated Circuits***

- SA602AN Mixer/oscillator
- NTE824 Audio preamplifier (two)
- 20 MHz crystal oscillator module

***Transistors***

- J-310 junction field effect (JFET)
- 2N-3904 bipolar, NPN
- 2N-3906 bipolar, PNP

***Other components***

- 7 diodes
- 7 inductors
- 32 resistors
- 44 capacitors

Detailed information on the Radio JOVE project is available by searching on the National Aeronautics and Space Administration (NASA) web site: www.nasa.gov